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Introduction

Consider the following question:

"A proposed development activity that promises substantial economic benefits will have significant adverse impacts on fish and wildlife resources in the area. What percentage of all your agency wildlife and fisheries professionals could develop and present a fully professional defense for the faunal interests in the area to an audience largely oriented towards commodity development?"

Before you become too uneasy with your answer to that question, let me pose another:

"Your wildlife and fish budget request to carry out a proposed program, regulatory activity, project or operation has been challenged. What percentage of all your agency wildlife and fisheries professionals could adequately defend the budget request to non-biologists?"

If your answers to both questions are personally discomforting, I will add to your dismay by saying that you are part of the majority. In a recent survey, these same questions were posed to a number of federal agency administrators of wildlife and fish programs who collectively represent nearly 3,500 wildlife and fisheries professionals. These administrators indicated that less than half of their staffs could effectively perform either task.

A consensus within the profession has been established (Cookingham et al. 1980) that the level of skills of biologists in essential non-biological areas should be upgraded. Functional specialists are not well-equipped to deal with broader aspects of their responsibilities. Here, we further explore the adequacy of the formal education of professional resource managers to understand and apply concepts of ecological, economic, and sociological analysis.

While federal wildlife and fishery management programs will continue to be determined by many factors, analytical methods adopted from non-biological disciplines are gaining increasing emphasis for use in rationalizing the advantages of resource management alternatives and in competition for scarce budget allocations and personnel ceilings. Wildlife and fisheries biologists and managers must have some minimum level of understanding of the institutional context in which the fate of their resources is determined and of the importance and use of the tools associated with that process. This paper contrasts the level of knowledge regarding various institutional themes held by federal wildlife and fisheries professionals with the level thought to be required by their respective agencies. The paper also presents a summary of priority training needs and a discussion of alternative delivery systems for implementing such training programs.

Methods of Conducting This Study

In late 1981, the views of federal agency administrators on their agency needs of wildlife and fisheries professionals in the ancillary skills of various institutional themes were surveyed with a written questionnaire. For the purposes of this study, wildlife and fisheries professionals were defined as those employees whose duties are to perform, under general administrative supervision and with wide latitude for the exercise of independent judgment, work in administering, directing, or exercising control over programs, regulatory activities, projects, or operations that are concerned with fish and wildlife conservation and management.

The questionnaire was mailed to key administrators within the headquarters offices of the USDA Forest Service, Soil Conservation Service, the USDI Fish and Wildlife Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, and the National Marine Fisheries Service. Collectively, the replies from these agencies were based on an assessment of 3,489 wildlife and fisheries professionals. Our conclusions are based on the collective response from these agencies. The questionnaire format and summarized survey results are shown as Table 1.

The questionnaire asked each agency to (1) identify the importance or priority of knowledge of selected institutional topics (see Table 1) to wildlife and fisheries professional *positions* in their agency, (2) identify the current level of knowledge of the topics held by *current occupants* of these positions; and (3) identify their priorities for training wildlife and fisheries professionals in these topical areas. Because the scope of this survey focused on a general state-of-affairs, the personal judgments of the agency respondents were adequate.

The first portion of the survey asked each agency to indicate the priority that they would assign to knowledge of selected institutional topics for wildlife and fisheries professional positions in their respective organizations. Given the total number of professional positions within each agency, the respondents were asked to enter the percentage of positions that fell under each priority class for each topic. A high priority designation meant that knowledge of the topic was essential to do an adequate job in the position. Assignment of a medium priority ranking inferred that knowledge of the topic is not essential for an adequate performance in the position, but was essential for the best possible performance in the position. A low priority designation meant that knowledge of the topic was not required for performing in the position. A summary of the answers to this question is presented in Part A of the questionnaire.

The second portion asked each agency to identify the current level of knowledge of the institutional topics that were held by current occupants of their wildlife and fisheries professional positions. The respondents were asked to focus just on the positions identified in Part A as having a high or medium priority for knowledge of each topic. Agency respondents were requested to enter the percentages of current professional staff that could be categorized under four levels of knowledge:

1. exceeds level for current position;
2. fully adequate for current position;
3. generally adequate, but individual is frequently perplexed; and
4. below level required for current position.

Table 1 (Part A). Identification of the importance of knowledge of selected topics to wildlife and fisheries biologist *positions*.

Percentage figures indicate the priority that respondents assigned to a knowledge of the listed topics for wildlife and fisheries professional positions in their agency. The percentages indicate the total number of positions that fall under each priority class.

	Priority class		
	High priority–essential knowledge required to do an adequate job	Medium priority–not essential for an adequate performance, but essential for best possible performance	Low priority–knowledge not required for performance
SAMPLE—role of government in the economy	10%	50%	40%
1. the role and responsibility of the civil servant in government and society	42%	39%	19%
2. how decisions about general agency policies are made	48%	37%	15%
3. how decisions about annual agency budgets are made	43%	36%	21%
4. the operating relationship between my agency and other federal agencies	46%	33%	21%
5. the operating relationship between my agency and state wildlife and fish agencies	58%	24%	18%
6. the operating relationship between my branch of my agency and other branches	80%	17%	3%
7. the relative importance of various interest groups that influence my agency	63%	26%	11%

Table 1 (Part A). (cont'd.)

	Priority class		
	High priority–essential knowledge required to do an adequate job	Medium priority–not essential for an adequate performance, but essential for best possible performance	Low priority–knowledge not required for performance
8. the factors that affect the opinions of those influential groups	49%	41%	10%
9. the impacts of my agency's activities on wildlife and fish resources	67%	19%	14%
10. the impacts of my agency's activities on the economic circumstances and quality of life of people	49%	35%	16%
11. the requirement for and application of economic and social analysis techniques to wildlife and fisheries problems within my agency	27%	37%	36%

A summary of the answers to the second question is presented in Part B of the questionnaire.

The third portion of the survey served as a cross-check on the training priorities that evolved from the summaries shown in Parts A and B of the questionnaire. We asked the agency respondents to indicate their priorities for training wildlife and fisheries professionals in the listed institutional topics.

Results of the Study

Federal agencies appear to be satisfied with their professional employees' level of knowledge regarding the role and responsibility of the civil servant in government and society. Only 17 percent of the current professional staff were assessed as requiring additional training in this topic and the agencies assigned it one of their lowest priority ratings on the training needs agenda.

Although additional training on the development of agency policies has apparently been relegated to a "back-burner" status, the respondents indicated a high

Table 1 (Part B). Identification of current level of knowledge of selected topics held by *current occupants* of biologist positions.

Percentage figures indicate the total number of professional employees that hold the delineated levels of knowledge.

	Current levels of knowledge			
	Exceeds level for current position	Fully adequate for current position	Generally adequate but individual frequently perplexed	Below level required for current position
SAMPLE—role of government in the economy	5%	50%	30%	15%
1. the role and responsibility of the civil servant in government and society	10%	35%	38%	17%
2. how decisions about general agency policies are made	4%	19%	47%	30%
3. how decisions about annual agency budgets are made	3%	14%	38%	45%
4. the operating relationship between my agency and other federal agencies	8%	36%	30%	26%
5. the operating relationship between my agency and state wildlife and fish agencies	9%	27%	27%	37%
6. the operating relationship between my branch of my agency and other branches	7%	31%	39%	23%
7. the relative importance of various interest groups that influence my agency	13%	33%	36%	18%

Table 1 (Part B). (cont'd.)

	Current levels of knowledge			
	Exceeds level for current position	Fully adequate for current position	Generally adequate but individual frequently perplexed	Below level required for current position
8. the factors that affect the opinions of those influential groups	49%	41%	10%	
9. the impacts of my agency's activities on wildlife and fish resources	67%	19%	14%	
10. the impacts of my agency's activities on the economic circumstances and quality of life of people	49%	35%	16%	
11. the requirement for and application of economic and social analysis techniques to wildlife and fisheries problems within my agency	27%	37%	36%	

priority need for training in agency budget formulation processes. Knowledge of this topic was indicated as appropriate for approximately 79 percent of the professional positions represented in this assessment. However, nearly one-half of the current occupants of these positions were considered as having a skill level below that required for their job. The agency respondents collectively assigned this topic as one of the highest priority training needs.

Knowledge of the operating relationships between and within agency organizational structures, and between federal agencies and state wildlife and fish agencies appears to be important. Levels of knowledge held by current professionals were assessed as needing to be upgraded, but in the context of a mid-level priority for actual training programs to be implemented.

The category of topics exhibiting the poorest correlation between apparent training needs and assigned training priorities is that pertaining to interest groups that influence federal agency policies and operations. Both topics in this category

are cited as important elements of knowledge for performing in professional wildlife and fisheries positions. The level of knowledge within these topical themes held by current professional staff is assessed as relatively low, indicating an apparent training priority. The training priority assigned by the agency respondents, however, is not commensurate with this presumption. The low priority assignment might simply reflect the current situation. An era of active lobbying by these groups occurring during the survey period might have increased the assigned priority for these topics.

Knowledge of the impacts of federal agency activities on wildlife and fish resources was rated considerably higher in importance than a comparable knowledge of the impacts of human resources. Although the current levels of knowledge for both topics are normally distributed across the four skill level categories—indicating a relatively low training priority—the survey respondents assigned one of their highest priority rankings for all topics to the knowledge of agency impacts on faunal resources. Knowledge of agency impacts on the economy and quality of life was assigned a more moderate priority in line with its apparent stature as indicated in the questionnaire summaries.

The preceding priorities probably conform to most of our expectations. Wildlife and fish resources have traditionally been involved in land use decisions involving competing uses of resources primarily as legal or social constraints. The historically poor showing of faunal resources when pitted against competing resources for land use is largely attributable to our insistence that they be viewed as a functional independent rather than from an integrated perspective with other commodity resources. As a profession, we have focused on minimizing adverse impacts on faunal resources in competing resource use decisions because we have not been able to play by the same "rules-of-the-game" as practiced for commodity resource areas. This defensive approach has guaranteed an underdog status for wildlife and fish resources, and we resource managers have reacted, as expected with most underdogs, in a highly defensive and inward-looking fashion, to the exclusion of other ecological, economic and social concerns of the ecosystem.

The present decade demands that wildlife and fisheries professionals change their approach. Wildlife and fisheries managers will have to deal with projections of future demands and supplies of resources and causes and effects of change in their planning processes. Such planning concepts are necessary to reduce future resource deficiencies and conflicts resulting from misallocation of land, labor and capital (USDA Forest Service 1981). We believe the survey respondents recognized this, if somewhat hesitantly, in their response to the last topical entry on the questionnaire.

Almost 40 percent of the 3,500 professional positions represented in the survey were judged by the respondents as not requiring knowledge of the requirement for and application of economic and social analysis techniques to wildlife and fisheries problems. Of the 64 percent of positions for which this topic was considered relevant, the respondents stated that about half of the current biologists were deficient in the skill required for the job. The apparent and assigned training priority is high for this topic, probably higher than indicated in the summaries because of the relevance of the topic to an obviously larger number of professional staff than the survey results indicate.

Alternative Delivery Systems

A wide array of approaches to developing and presenting instruction in the priority institutional topics is possible. They include university training, in-service training, and individual development.

Federal employees have frequently been enrolled at the graduate level in standard university curricula, usually under provisions of the Government Employee Training Act, to increase their technical capabilities. When several employees enroll together, universities frequently offer supplementary guidance and seminars to meet the particular needs of such students. There have also been instances where one or several universities have developed specialized graduate-level curricula to meet the particular needs of a sponsoring federal agency. However, most federal employees receive university training through much more narrowly focused short courses that last several days to a week.

Most federal in-service training is also brief and focused on narrow technical or managerial topics. Highly structured short courses frequently rely on a mix of agency personnel and consultants for instructors. The more common workshops tend to be strongly oriented towards resolving current problems and usually rely on group interactions and practicums rather than on information-giving.

Individual development relies almost solely on individual initiative. Numerous correspondence courses are available; the Soil Conservation Service offers a correspondence course in economics to its employees and the USDA Graduate School offers a full catalogue of courses to anyone who is interested. The Society of American Foresters has developed an elaborate technique to structure activities of individual members. Definitions of Society-required types of involvement, detailed record-keeping, and public recognition of accomplishments are key ingredients.

Given an objective to provide a general understanding of the selected institutional topics to federal wildlife and fisheries professionals, and considering probable limitations on expenditures, the standard and specialized university curriculum approaches can be discarded in the context of this report (recognizing that they may be relevant in particular circumstances). However, in the long-run, guest lecturing by agency personnel, participation on professional committees concerned with education, and other techniques to influence traditional university curricula are relevant and important activities.

Developing a course of instruction to be administered by mail seems a promising, low-cost approach. Because correspondence courses involve little student-teacher and no student-student interaction, however, they appear to be most suitable for supplementing or reinforcing on-site instruction. The broader, self-designed development approach is probably best suited for professionals to keep up-to-date in the area where they already have firm training.

The remaining methods are short courses and workshops. Since wildlife and fisheries professionals cannot reasonably be assumed to be well-grounded in the selected themes, it will be necessary to discuss concepts in some depth through structured lectures. Therefore, the most promising delivery system is a short course that includes both lectures and practicums, perhaps supplemented with at-home readings and applications.

Conclusions and Recommendations

In summary, we conclude that the survey results identify high priority needs in the following topics that directly relate to the hypothetical situations introduced at the beginning of this paper: (1) *the requirement for and application of economic and social analysis techniques to wildlife and fisheries problems,* and (2) *how decisions about annual agency budgets are made.*

There are several options for developing a course of instruction on these topics that are amendable to the training delivery system outlined earlier: through an ad hoc group of agency employees; through a contract with a consultant or university; or through some sort of professional wildlife group or consortium of agencies, perhaps utilizing a joint contract.

The first two options have the advantage of ensuring full agency control of the course, including the exploration of agency-specific requirements and problems. The third option would probably be less costly and promises the usual benefits of cooperative efforts.

The survey discussed earlier suggests that agency instructors are needed to define "how it really works," and professional educators are needed to provide the basics of more general skills or knowledge. Too many dollars have been wasted in having unprepared consultants talk about budgets and organization and agency employees talk about theory. Although large numbers of wildlife and fishery biologists in widely scattered locations require training, costs must be kept under tight control. We think it can be done if advantage is taken of technology.

We suggest developing, in modules, a comprehensive course in the desired topics for repeated presentation. This can be done through federal contracting with a university to produce videotaped instruction and supplementary printed materials. Selected modules could then be presented anywhere in the country; they could be supplemented with geographically-specific and/or agency-specific instruction; and appropriate printed materials would permit integration of taped instruction, practicums and self-study.

Such an approach would be a cost-effective means of developing and presenting instruction to large numbers of biologists. And it would be a feasible vehicle for cooperation among federal agencies, universities and professional organizations.

To this point, the wildlife profession has agreed that training in non-biological areas is deficient. This paper suggests that those deficiencies are of concern to federal agencies employing 3,500 wildlife and fisheries professionals. We believe that wildlife and fishery resources are being adversely affected as a result.

Who will do anything about it?

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